

# Mitefauna (Arachnida: Acari) associated to grapevine, *Vitis vinifera* L. (Vitaceae), in the municipalities of Bento Gonçalves and Candiota, Rio Grande do Sul, Brazil

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**ABSTRACT:** The mitefauna associated to Merlot and Chardonnay grapevine cultivars and associated plants in the municipalities of Bento Gonçalves and Candiota, Rio Grande do Sul was investigated. The study was developed between October 2006 and September 2007, where 20 grapevine plants were randomly chosen from each municipality and monthly sampled. Three leaves of each plant were taken. A total of 11,598 mites belonging to 14 families and to 52 species were found. Fifty-nine percent of the total specimens were collected in Candiota, being 93% associated to the Merlot cultivar. Higher species richness was observed on associated plants. Phytoseiidae showed the highest species richness, with ten species, and Eriophyidae showed the highest abundance, with 8,675 specimens. *Calepitrimerus vitis* (Nalepa, 1905) and *Polyphagotarsonemus latus* (Banks, 1904) were the most common phytophagous mites, while *Neoseiulus californicus* (McGregor, 1954) and *Pronematus anconai* (Baker, 1943) were the most common predators.

## INTRODUCTION

Grapevine, *Vitis vinifera* L. (Vitaceae), was introduced in Brazil at 1532 by Martin Afonso de Souza expedition to São Paulo state (Lorenzi *et al.* 2006). Although it is cultivated today in nearly all regions of the country, the so called 'Serra Gaucha' region of the state of Rio Grande do Sul has currently the greatest vineyards and wineries concentration. More recently, vineyards have been implanted in the well-drained sandy soils of the flatter state region bordering Uruguay and Argentina (Botton *et al.* 2003; Mello 2008), that seems to be the region with the greatest potential for wine quality.

Grapevine plants are attacked by diseases, insects and mites. Amongst the phytophagous mites, the most important are those belonging to Eriophyidae, Tarsonemidae, Tenuipalpidae and Tetranychidae, since they frequently reach damage level in the vineyards (Reis and Melo 1984; Johann *et al.* 2009; Schruft 1985; Monteiro 1994; Duso and De Lillo 1996; Botton *et al.* 2003; Ferreira *et al.* 2006).

The most important eriophyid mites associated to vineyards are *Calepitrimerus vitis* (Nalepa, 1905) and *Colomerus vitis* (Pagenstecher, 1857) (Duso and De Lillo 1996; Jeppson *et al.* 1975). Three reported strains of *Colomerus vitis*, being each one characterized by the type of injury produced, are: the bud strain, the erineum strain and leaf-curling strain (Jeppson *et al.* 1975; Flechtman 1979; Duso and De Lillo 1996). The symptoms caused by *Calepitrimerus vitis* was brown scarification and necrosis on the inside of outer bud scales may be found under these mites attack, causing death of the growing point and sometimes of entire buds before sprouting. Injuries caused on shoots are drying, shortened internodes and development of lateral shoots. Injuries on leaves depend

on the season and leaf age. Infestation on growing leaves causes deformation due to irregular unfolding of the leaf tissues, with lacerations of the leaf margin, chlorotic spots often with necrosis in the center, and premature leaf fall (Duso and De Lillo 1996). *Calepitrimerus vitis* population was already observed on Alfrocheiro, Cabernet Sauvignon and Pinot Noir cultivars in Candiota, Encruzilhada do Sul and Bento Gonçalves regions, Rio Grande do Sul (Ferla *personal observations*; Johann *et al.* 2009).

*Polyphagotarsonemus latus* (Banks, 1904) (Tarsonemidae) develops mainly on young leaves, turning down their edges, causing browning and necrosis (Monteiro 1994). This species was already reported in vineyards in the state of Rio Grande do Sul (Johann *et al.* 2009), however it has not been considered of economic importance so far (Botton *et al.* 2005).

Several Tetranychidae species are associated to grapevine (Bolland *et al.* 1998), being *Panonychus ulmi* (Koch, 1836) the most important species in Northern Europe. *Panonychus ulmi* feeds mainly on the undersurface of leaves and its attack is particularly harmful in early spring and late summer. In summer, feeding of the mites causes bronzing of the leaves and affects the quality of fruits (Schruft, 1985). In Brazil, it was recently associated to viticulture (Ferla and Botton 2008). The attack diminishes the plant's photosynthetic surface, reduces the branches growing, the size and the color of the fruits and may cause premature leaf fall, interfering on the flowering and fructification in the following year (McMurtry *et al.* 1970; Croft 1975; Schruft 1985; Lorenzato 1987; Sousa 1996). *Oligonychus mangiferus* (Rahman and Punjab, 1940) and *Allonychus brasiliensis* (McGregor, 1950) were also reported from Brazil (Johann *et al.* 2009).

Although predatory mites from different families have

already been associated to grapevine, few studies about their predation capacity were carried out. Phytoseiid mites are efficient natural enemies of pest mites of several crops, and its presence is frequently associated with eriophyid mites in Rio Grande do Sul (Ferla *pers. obs.*), with *Euseius alatus* DeLeon, 1966, *Euseius brazilli* (ElBanhawy, 1975), *Neoseiulus fallacis* (Garman, 1948) and *Neoseiulus tunus* Denmark and Muma, 1967 already reported on grapevine (Johann *et al.* 2009; Monteiro 1994).

Despite the economic importance and the damage caused by some phytophagous mites on grapevine in Brazil, little is known about the species associated to this culture. However, because of the increase of the production area and the expansion in the border region of Uruguay and Argentina, it is fundamental to know the mitefauna associated and the damage caused by the most abundant and frequent species. Only then, a management plan to control mites in this culture can be suggested.

The present work aimed to identify the mitefauna associated to Chardonnay e Merlot varieties and associated plants during the harvest of 2006/2007 in the municipalities of Bento Gonçalves and Candiota, in the state of Rio Grande do Sul, Brazil.

## MATERIALS AND METHODS

This study was carried out in vineyards of Chardonnay and Merlot varieties located in the municipalities of Bento Gonçalves (29°13' S, 51°33' W) and Candiota (31°28' S, 53°40' W), between October 2006 and September 2007 (Figure 1). Phytosanitary treatments with acaricides were not conducted during the study in the evaluated areas. The last treatment was applied on the harvest of 2005/2006.

The survey was conducted monthly with twenty plants of grapevine randomly selected from each area. A branch

from each plant was sampled, throughout the collection of three leaves from the apical, median and basal regions, respectively, totalizing 60 leaves per area. To evaluate the presence of mites on buds during senescence period, branches from twenty plants were removed and three buds by branch were sampled. Also, leaves from the five most common weeds around the grapevine rows were collected in enough quantity for one hour of sampling effort.

All collected leaves were introduced in paper bags, kept in a cooler box with Gelox® under low temperature ( $\pm 15^{\circ}\text{C}$ ) and taken to the laboratory, where the material was stored under refrigeration for up to seven days until examination under a stereoscopic microscope for extraction of the mites. Mites found were collected with fine-tipped paintbrush and mounted with Hoyer's medium in microscopic slides (Jeppson *et al.* 1975). Slides were kept in a kiln during ten days at 50-60 °C to fix, to distend and to brighten up the specimens and to dry the medium. The identification was conducted under phase contrast microscope and with the help of the dichotomics keys (Amrine 1996; Baker *et al.* 1996; Baker and Tuttle 1994; Chant and McMurry 1994, 2003a and b, 2004a and b; 2005a, b and c; Halliday, Walter and Lindquist 1998; Krantz 2009; Lindquist 1986; Matioli, Ueckermann and Oliveira 2002; Smiley 1992; Summers and Price 1970). The plants species were identified by Dra. Elisete Maria de Freitas.

Voucher specimens of each species found were deposited on the mites reference collection of the Museu de Ciências Naturais of Centro Universitário UNIVATES (ZAUMCN), Lajeado, Rio Grande do Sul.

## RESULTS AND DISCUSSION

A total of 11,598 mites belonging to 14 families were found. Fifty-nine percent of the specimens were collected in Candiota, being 93% associated to Merlot cultivar.

The mites found belonged to 52 species. Phytoseiidae showed the highest species richness, with ten species, followed by Tetranychidae and Stigmaeidae, with six species each, Tydeidae, with five species, and Ascidae, Eriophyidae and Tarsonemidae, with four species each. Eriophyidae showed the highest abundance, with 8,675 specimens, followed by Tarsonemidae, with 1,228 and Tydeidae, with 814.

The mite species and the host plants are presented below, along with the municipality, the cultivar, month and year of collection. Number of specimens is informed in brackets.

## SUBORDER MESOSTIGMATA

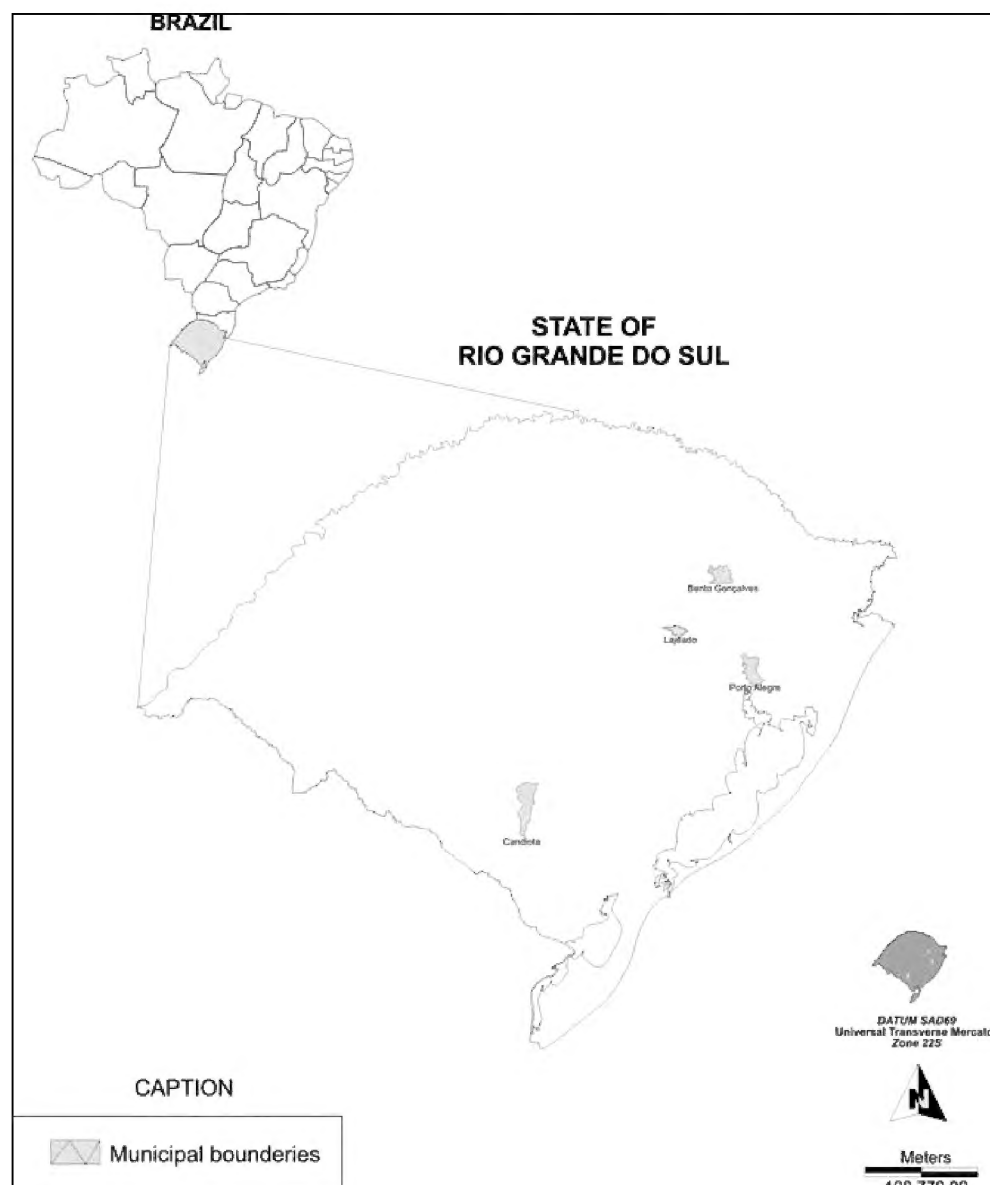
### ASCIDAE Voigts and Oudemans, 1905

#### *Asca* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: *Plantago tomentosa* Lam. (1791) , VIII-2007 (1♀). **CANDIOTA**: **Chardonnay**: IV-2007 (1♀), VI-2007 (1♀), from *P. tomentosa*; **Merlot**: III-2007 (1♀), from *Solanum americanum* Mill. (1768).

#### *Diseius* sp.

Locality of the specimens examined: Brazil, Rio Grande



**FIGURE 1.** Location of the municipalities of Candiota and Bento Gonçalves, in the state of Rio Grande do Sul, Brazil.



do Sul, **BENTO GONÇALVES: Chardonnay**: VIII-2007 (1♀), from *P. tomentosa*.

*Lasioseius* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot**: II-2007 (1♀), from *Taraxacum officinale* F. H. Wigg. (1780).

*Leioseius* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: VIII-2007 (1♀), from *P. tomentosa*. **CANDIOTA: Chardonnay**: VI-2007 (1♀), from *P. tomentosa*.

PHYTOSEIIDAE Berlese, 1913

*Amblyseius vitis* Ferla and Silva, 2009

*Amblyseius vitis* Ferla and Silva, 2009: 509-510.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: VII-2007 (1♀), from *Stachys arvensis* L. (1763) ; IX-2007 (1♀), from *Rumex* sp.. **CANDIOTA: Chardonnay**: IV-2007 (1♀), from *P. tomentosa*.

Three adult females measurements: dorsal shield 443 (435-450) long and 304 (300-308) wide, j1 32 (25-37), j3 36 (32-38), j4 5 , j5 5, j6 5, J2 7 (7-8), J5 10 (7-13), z2 5, z4 6 (5-7), z5 6 (5-7), Z1 7 (5-8), Z4 214 (212-215), Z5 429 (405-442), s4 186 (175-195), S2 11 (10-12), S4 11 (10-12), S5 9 (8-10), r3 12 (12-13), R1 8 (7-10), SgI 71 (70-75), SgII 48 (45-50), SgIII 99 (97-100), StiIII 76 (75-80), SgIV 225 (223-227), StiIV 178 (173-185), StIV 145 (143-147), ST1-ST3 76 (75-80), ST2-ST2 91 (88-97), G-G 91 (87-97), ventrianal shield 135 (130-137) anterior wide, 101 (97-105) posterior wide and 105 (90-117) long, cervix of spermatheca 22 (20-25), fixed digit 44 (42-46), mobile digit 41 (38-43).

Previous records for Brazil: Rio Grande do Sul (Ferla and Silva 2009).

Comments: This species was described recently from the specimens collected on associated plants in vineyards in the state of Rio Grande do Sul.

*Arrenoseius gaucho* Ferla, Silva and Moraes, 2010

*Arrenoseius gaucho* Ferla, Silva and Moraes, 2010: 15-17

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: VIII-2007 (3♀1♂), from *P. tomentosa*; II-2007 (2♀), from *Solanum mauritianum* Scopoli (1788) **Merlot**: VIII-2007 (1♀), from *Plantago lanceolata* L. (1753); X-2006 (4♀3♂), XI-2006 (2♀), from *P. tomentosa*; V-2007 (2♀), from *Synedrella nodiflora* (L.) Gaertn (1791). **CANDIOTA: Chardonnay**: IV-2007 (3♀2♂), VI-2007 (2♀), from *P. tomentosa*; VI-2007 (2♀), from *Rumex* sp.. **Merlot**: VI-2007 (1♀), from *Blainvillea* sp.; I-2007 (1♀1♂), III-2007 (1♀), from *Richardia brasiliensis* Gomes (1801); VI-2007 (1♀), from *Senecio* sp..

Ten adult females measurements: dorsal shield 308 (295-325) long and 223 (207-245) wide, j1 21 (18-25), j3 20 (15-35), j4 11 (10-13), j5 9 (5-13), j6 10 (5-13), J2 11 (10-13), J5 9 (8-10), z2 19 (13-30), z4 12 (8-15), z5 7 (5-8), Z1 13 (8-15), Z4 66 (53-73), Z5 64 (58-70), s4 47

(30-65), S2 24 (13-28) , S4 11 (8-13), S5 10 (8-13), r3 20 (15-25), R1 13 (10-15), SgIV 46 (38-55), StiIV 30 (18-38) , StIV 41 (38-58), ST1-ST3 57 (53-63), ST2-ST2 68 (65-73), G-G 69 (65-78), ventrianal shield 98 (90-103) anterior wide, 83 (75-88) posterior wide and 103 (95-113) long, spermatheca cervix 16 (10-28), fixed digit 33 (31-36), mobile digit 30 (28-33).

Previous records for Brazil: Rio Grande do Sul (Ferla et al. 2010).

*Euseius ho* (De Leon, 1965)

*Amblyseius (Euseius) ho* DeLeon, 1965: 125.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: III-2007 (4♀), from *V. vinifera* leaf. **Merlot**: VII-2007 (1♀), from *P. tomentosa*.

Three adult females measurements: dorsal shield 343 (320-364) long and 252 (195-335) wide, j1 28 (27-30), j3 28 (23-38), j4 11 (7-18), j5 10 (8-10), j6 11 (10-13), J2 13 (12-13), J5 6 (5-8), z2 14 (12-15), z4 17 (15-18), z5 9 (8-10), Z1 13 (12-13), Z4 13 (12-15), Z5 52 (50-53), s4 28 (25-30), S2 15 (13-15), S4 17 (15-18), S5 18 (15-20), r3 13 (12-15), R1 11 (10-13), SgI 24 (23-25), SgII 24 (23-25), SgIII 27 (25-28), StiIII 23 (18-25), SgIV 33 (30-38), StiIV 27 (25-30), StIV 49 (45-52), ST1-ST3 59 (55-60), ST2-ST2 67 (65-70), G-G 75 (70-80), ventrianal shield 56 (50-62) anterior wide, 69 (57-75) posterior wide and 105 (100-105) long, spermatheca cervix 23 (22-23), fixed digit 24 (20-25), mobile digit 22 (20-25).

Previous records for Brazil: Bahia, Ceará, Paraíba, Pernambuco, Rio Grande do Sul, Santa Catarina and São Paulo (Denmark and Muma 1973; Moraes and McMurtry 1983; Moraes et al. 1990; Gondim Jr. and Moraes 2001; Zacarias and Moraes 2001; Ferla et al. 2005).

Comments: This species was reported in citrus and yerba mate crops in Taquari Valley, Rio Grande do Sul (Ferla et al. 2005). Species of this genus are common in native vegetation in that state (Ferla and Moraes 2002). *Euseius* species are polyphagous, but the reproductive potential of many species is highest on pollen (McMurtry and Croft 1997).

*Euseius inouei* (Ehara and Moraes, 1998)

*Amblyseius (Euseius) inouei* Ehara and Moraes, 1998: 59.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot**: V-2007 (1♀), from *Rumex* sp.; IV-2007 (1♀1♂), from *V. vinifera* leaf; V-2007 (2♀), VI-2007 (1♀), from *V. vinifera* bud.

Four adult females measurements: dorsal shield 338 (318-350) long and 210 (205-220) wide, j1 28 (28-30), j3 24 (12-30), j4 13 (10-17), j5 16 (12-15), j6 17 (15-18), J2 17 (15-22), J5 7 (6-8), z2 19 (17-23), z4 22 (20-25), z5 16 (15-18), Z1 17 (12-20), Z4 22 (17-25), Z5 61 (57-65), s4 31 (27-35), S2 22 (20-25), S4 27 (23-30), S5 29 (25-32), r3 15 (13-18), R1 14 (12-15), SgI 20 (18-25), SgII 21 (20-23), SgIII 27 (25-30), StiIII 21 (17-23), SgIV 39 (37-48), StiIV 24 (18-28), StIV 47 (43-50), ST1-ST3 60 (55-72), ST2-ST2 68 (63-70), G-G 76 (73-80), ventrianal shield 63 (57-75) anterior wide, 77 (74-87) posterior wide and 99 (95-103) long, spermatheca cervix 26 (21-28), fixed digit 25 (23-25), mobile digit 22 (20-23).

Previous records for Brazil: Rio Grande do Sul (Ferla and Moraes 2002).

Comments: The first record of this species in Brazil is by Ferla and Moraes (2002) in native and cultivated plants of Rio Grande do Sul.

*Neoseiulus anonymus* (Chant and Baker, 1965)

*Amblyseius anonymus* Chant and Baker, 1965:21

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: XI-2006 (1♀), from *V. vinifera* leaf.

The adult female measurement: dorsal shield 363 long and 180 wide, j1 20, j3 38, j4 28, j5 28, j6 40, J2 50, J5 10, z2 18, z4 38, z5 28, Z1 45, Z4 65, Z5 78, s4 50, S2 63, S4 35, S5 35, r3 33, R1 30, StIV 50, ST1-ST3 58, ST2-ST2 63, G-G 65, ventrianal shield 85 anterior wide and 75 posterior wide, spermatheca cervix 11, fixed digit 30, mobile digit 25.

Previous records for Brazil: Alagoas, Bahia, Paraíba, Paraná, Pernambuco, Rio Grande do Sul, Santa Catarina and São Paulo (Moraes et al. 2004).

Comments: This species belongs to a group of predators that show high oviposition rate when feeding on tetranychid mites (Ferla and Moraes 2003).

*Neoseiulus californicus* (McGregor, 1954)

*Typhlodromus californicus* McGregor, 1954: 89.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: XI-2006 (1♀), I-2007 (2), II-2007 (2♀1♂), from *V. vinifera* leaf. **Merlot**: V-2007 (1♀), from *Bidens pilosa* L. (1753); II-2007 (1♀), from *Conium maculatum* L. (1753); IV-2007 (1♀), from *Sonchus oleraceus* L. (1753); I-2007 (9♀5♂), II-2007 (10♀2♂), IV-2007 (6♀), from *V. vinifera* leaf; V-2007 (2♀), from *V. vinifera* bud. **CANDIOTA: Chardonnay**: VIII-2007 (1♀), from *Conyza canadensis* (L.) Cronquist (1943); IV-2007 (1♀), from *P. tomentosa*; IV-2007 (1♀), from *S. sataremnensis*; VI-2007 (1♀), from *S. chilensis*; I-2007 Meyen (1834) (5♀3♂), II-2007 (9♀3♂), III-2007 (23♀10♂), IV-2007 (35♀7♂), from *V. vinifera* leaf. **Merlot**: IV-2007 (1♀), from *B. pilosa*; VI-2007 (1♀), from *Blainvillea* sp.; VI-2007 (4♀1♂), from *Senecio* sp.; XI-2006 (1♀), I-2007 (23♀6♂), II-2007 (5♀), III-2007 (11♀2♂), IV-2007 (6♀), from *V. vinifera* leaf; V-2007 (3♀), from *V. vinifera* bud.

Seven adult females measurements: dorsal shield 352 (325-367) long and 168 (157-175) wide, j1 19 (17-22), j3 25 (22-32), j4 17 (12-22), j5 17 (15-22), j6 21 (17-25), J2 27 (22-30), J5 12 (10-12), z2 23 (17-25), z4 27 (20-32), z5 19 (17-20), Z1 26 (22-30), Z4 46 (42-50), Z5 64 (62-65), s4 28 (22-35), S2 34 (30 - 40), S4 31 (27-35), S5 27 (25-30), r3 21 (17-25), R1 20 (17-22), StIV 46 (40-52), ST1-ST3 60 (50 -65), ST2-ST2 60 (55-65), G-G 61 (55-68), ventrianal shield 107 (95-110) anterior wide, 87 (80-97) posterior wide and 116 (105-132) long, spermatheca cervix 12 (10-15), fixed digit 28 (25-32), mobile digit 24 (20-27).

Previous records for Brazil: Rio Grande do Sul (Ferla and Moraes 1998, 2002).

Comments: Specialized on tetranychid mites control (McMurtry and Croft 1997). It has been released on apple crop to control *P. ulmi* and *Tetranychus urticae* (Koch 1836) in Rio Grande do Sul and Santa Catarina (Monteiro 2002).

*Neoseiulus tunus* (DeLeon, 1967)

*Typhlodromips tunus* DeLeon, 1967: 29.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: III-2007 (2♀), from *V. vinifera* leaf.

Two adult females measurements: dorsal shield 301 (295-307) long and 179 (175-182) wide, j1 25, j3 26 (25-27), j4 9 (7-10), j5 9 (7-10), j6 15, J2 15, J5 8 (7-8), z2 21 (20-22), z4 32 (30-33), z5 12 (10-13), Z1 24 (23 -24), Z4 47 (45-48), Z5 75, s4 44 (40-47), S2 35 (33-37), S4 16 (15-17), S5 13 (12-13), r3 26 (25-27), R1 15, SgIV 18 (17-18), StIV 26 (25-27), ST1-ST3 64 (57-70), ST2-ST2 68 (67-68), GG 60 (58 -62), ventrianal shield 77 (75-78) anterior wide, 63 (60-65) posterior wide and 104 (100-107) long, spermatheca cervix 11 (10-12), fixed digit 32 (30 -33), mobile digit 29 (27-30).

Previous records for Brazil - Rio Grande do Sul, Santa Catarina and São Paulo (Moraes et al. 2004; Feres and Moraes 1998; Ferla and Moraes 1998, 2002; Lorenzato and Secchi 1993).

Comments: Species found in untreated apple orchards and native plants grown in the state of Rio Grande do Sul (Ferla and Moraes 1998, 2002).

*Typhlodromalus aripo* (DeLeon, 1967)

*Typhlodromalus aripo* DeLeon, 1967: 21.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay**: IX-2007 (1♀), from *Senecio* sp..

The adult female measurement: dorsal shield 354 long and 197 wide, j1 31, j3 35, j4 11, j5 12, j6 15, J2 15, J5 8, z2 17, z4 29, z5 11, Z1 20, Z4 46, Z5 68, s4 43, S2 33, S4 23, S5 11, r3 19, R1 16, SgI 20, SgII 19, SgIII 24, StiIII 15, SgIV 44, StiIV 24, StIV 69, ST1-ST3 67, ST2-ST2 63, G-G 78, ventrianal shield 66 anterior wide, 70 posterior wide 118 long, spermatheca cervix 19, fixed digit 38, mobile digit 34.

Previous records for Brazil: Bahia, Ceará, Maranhão, Pernambuco, Piauí, Rio Grande do Sul and São Paulo (Moraes and McMurtry 1983; Ferla and Moraes 1998, 2002; Denmark and Muma 1973; Feres and Moraes 1998; Zacarias and Moraes 2001; Moraes et al. 2004).

Comments: This is the most common predatory mite in plants associated with strawberry in Rio Grande do Sul (Ferla et al. 2007).

*Typhlodromina tropica* (Chant, 1959)

*Typhlodromus tropicus* Chant, 1959: 54.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot**: IV-2007 (1♀), from *V. vinifera* leaf.

The adult female measurement: 370 dorsal shield length 255 width, j1 10, j3 37, j4 32, j5 30, j6 45, J2 45, J5 5, 27 z2, z3 42, z4 50, z5 35, Z4 65, Z5 60, s4 57, s6 62, 70 S2, S5 45, r3 25, R1 17, St1-St3 57, St2-St2 67, GG 75, ventrianal shield 105 long, 75 wide and 70 posterior wide, spermatheca cervix 25.

Previous records for Brazil: São Paulo and Rio Grande do Sul (Denmark and Muma 1973; Ferla and Moraes 2002).

*Typhlodromus ornatus* (Denmark and Muma, 1973)

*Amblydromella ornata* Denmark and Muma, 1973: 270.

*Typhlodromus ornatus* Gondim and Moraes, 2001: 25.



Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** IV-2007 (2♀), V-2007 (1♀1♂), from *V. vinifera* bud. **Merlot:** VI-2007 (2♀), from *V. vinifera* bud. **CANDIOTA: Chardonnay:** VI-2007 (1♀), from *P. tomentosa*; III-2007 (3♀), IV-2007 (1♀1♂), VI-2007 (1), from *V. vinifera* leaf. **Merlot:** VIII-2007 (2♀), from *V. vinifera* bud.

Seven adult females measurements: dorsal shield 357 (295-378) long and 187 (163-200) wide, j1 21 (12-25), j3 18 (13-21), j4 11 (8-13), j5 10 (10-15), j6 13 (10-18), J2 16 (13-20), J5 12 (9-15), z2 14 (10-18), z3 15 (13-23), z4 16 (13-23), z5 12 (10-15), Z4 24 (18-33), Z5 38 (35-48), s4 18 (15-23), s6 20 (18-25), S2 21 (18-25), S4 23 (18-25), S5 23 (15-38), r3 18 (15-18), R1 19 (15-25), StIV 18 (15-25), StIV 25 (20-30), ST1-ST3 70 (50-78), ST2-ST2 61 (50-73), G-G 59 (54-63), ventrianal shield 88 (70-100) anterior wide, 79 (60-93) posterior wide and 117 (108-135) long, spermatheca cervix 20 (15-28), fixed digit 31 (15-38), mobile digit 29 (25-33).

Previous records for Brazil: São Paulo (Gondim Jr. and Moraes 2001).

## SUBORDER PROSTIGMATA

CUNAXIDAE Thor, 1902

*Neocunaxoides* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **CANDIOTA: Chardonnay:** IV-2007 (1♀), VI-2007 (7♀), from *P. tomentosa*.

ERIOPHYIDAE Nalepa, 1898

*Aceria* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** I-2007 (40♀), from *S. mauritianum*. **CANDIOTA: Merlot:** IV-2007 (3♀), from *S. americanum*; XI-2006 (1♀), from *V. vinifera* leaf.

*Calepitrimerus vitis* (Nalepa, 1905)

*Epitrimerus vitis* Nalepa, 1905: 268.

Previous assignment: *Phyllocoptes*, *Epitrimerus*, *Calepitrimerus* (Amrine and Stasny 1994).

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** XII-2006 (1), I-2007 (38♀2♂), II-2007 (4♀), III-2007 (1♀), from *V. vinifera* leaf; **Merlot:** XI-2006 (3♀), XII-2006 (8♀), I-2007 (2.423), II-2007 (15♀), III-2007 (6♀), IV-2007 (2♀), from *V. vinifera* leaf. **CANDIOTA: Chardonnay:** I-2007 (14♀), II-2007 (58♀), III-2007 (28♀4♂), IV-2007 (2♀), from *V. vinifera* leaf; **Merlot:** I-2007 (2♀), from *Sida* sp.; I-2007 (1♀), from *S. americanum*; X-2006 (13♀), XI-2006 (212♀21♂), XII-2006 (12♀), I-2007 (5.611), II-2007 (74♀), III-2007 (11♀), IV-2007 (2♀), from *V. vinifera* leaf.

Previous records for Brazil: Rio Grande do Sul (Ferla pers. obs.; D'Andrea 1951).

Comments: This species of eriophyid mite was reported on viniferous grapevine in Candiota, Rio Grande do Sul (Ferla pers. obs.).

*Colomerus vitis* (Pagenstecher, 1857)

*Phytoptus vitis* Pagenstecher, 1857: 51.

Previous assignment: *Phytoptus*, *Eriophyies*, *Calomerus* (Amrine and Stasny 1994).

Locality of the specimens examined: **BENTO GONÇALVES: Merlot:** XI-2006 (1♀), XII-2006 (1♀), from *V. vinifera* leaf; VI-2007 (1♀), IX-2007 (44♀), from *V. vinifera* bud. **CANDIOTA: Merlot:** IV-2007 (1♀), from *V. vinifera* leaf.

Previous records for Brazil: Rio Grande do Sul (Johann et al. 2009; Braga 1957).

Comments: High populations may attack leaves, producing galls, and buds, causing deformation or even death (Duso and De Lillo 1996).

*Criotacus sidae* Keifer, 1977

*Criotacus sidae* Keifer, 1977, C13: 3, pl. 2.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** V-2007 (14♀), from *Sida santaremnensis* L. (1753).

Comments: First record in Brazil.

IOLINIDAE Pritchard, 1956

*Homeopronematus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** II-2007 (1♀), from *S. mauritianum*; I-2007 (3♀), from *V. vinifera* leaf.

*Metapronematus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** XII-2006 (2♀), I-2007 (2♀), from *V. vinifera* leaf. **Merlot:** XI-2006 (1♀), from *V. vinifera* leaf.

*Pronematus anconai* Baker, (1943) 1944

*Pronematus anconai* Baker, (1943) 1944: 188-189.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** XII-2006 (2♀), IV-2007 (6♀1♂), from *P. tomentosa*; VII-2007 (2♀), from *Rumex* sp.; I-2007 (2♀), II-2007 (2♀), from *S. mauritianum*; V-2007 (25♀2♂), VI-2007 (6♀), from *Sonchus oleraceus* L. (1753); I-2007 (1♀), VII-2007 (1♀), from *T. officinale*; XII-2006 (19♀), I-2007 (85♀12♂), II-2007 (9♀), III-2007 (8♀), from *V. vinifera* leaf; VI-2007 (8♀), from *V. vinifera* bud. **Merlot:** XII-2006 (2♀), from *Paspalum* sp.; VI-2007 (5♀), from *Poa annua* L. (1753); I-2007 (11♀), IV-2007 (1♀), from *S. oleraceus*; I-2007 (1♀), from *Trifolium repens* L. (1753); I-2007 (30♀14♂), from *V. vinifera* leaf. **CANDIOTA: Chardonnay:** V-2007 (1♀), from *S. americanum*; II-2007 (1♀), IV-2007 (3), from *S. oleraceus*. **Merlot:** IV-2007 (1♀), from *Bidens pilosa* L.; I-2007 (1♀), from *Digitaria* sp.; IV-2007 (1♀), V-2007 (2♀), from *R. brasiliensis*; VII-2007 (1♀), from *Senecio selloi* Spreng. (1837); IV-2007 (1♀), from *S. americanum*.

Distribution: It was described from Mexico specimens (Baker 1968).

Comments: This species is an important alternative prey for the predatory mite of *Metaseiulus occidentalis* (Nesbitt) in California vineyards (Flaherty and Hoy 1971). It feeds primarily on pollen, the predation rate on spider mite eggs is low and it could not reproduce on leaves having only spider mites eggs (Knop and Hoy 1983).

## PYEMOTIDAE Oudemans, 1937

*Pyemotes* sp.

Specimen examined: **BENTO GONÇALVES**: Brazil, Rio Grande do Sul, **Chardonnay**: VII-2007 (1♀), from *S. arvensis*.

*Pygmephorus* sp.

Locality of the specimens examined: **BENTO GONÇALVES**: **Chardonnay**: VIII-2007 (1♀), from *P. tomentosa*.

## STIGMAEIDAE Oudemans, 1931

*Agistemus* sp.1

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: III-2007 (2♀), from *V. vinifera* leaf.

*Agistemus* sp.2

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Merlot**: IV-2007 (2♀), from *Galinsoga* sp..

*Agistemus* sp.3

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Merlot**: V-2007 (2♀), from *Sida santaremnensis* H. Monteiro.

*Agistemus brasiliensis* Mاتيولي, Ueckermann and Oliveira, 2002

*Agistemus brasiliensis* Mاتيولي, Ueckermann and Oliveira, 2002: 206.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: I-2007 (2♀1♂), from *V. vinifera* leaf. **Merlot**: XI-2006 (1♀), IV-2007 (1♀), from *V. vinifera* leaf.

Previous records for Brazil: Rio Grande do Sul and São Paulo (Mاتيولي et al. 2002; Ferla et al. 2005).

Comments: Species associated with yerba mate in Rio Grande do Sul, with higher populations coinciding with eriophyid mites populations peaks (Ferla et al. 2005).

*Agistemus floridanus* Gonzalez, 1965

*Agistemus floridanus* Gonzalez, 1965: 42.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: XII-2006 (3♀), I-2007 (14♀6♂), II-2007 (25♀13♂), III-2007 (10♀), from *V. vinifera* leaf. **Merlot**: IV-2007 (1♀), from *P. tomentosa*; I-2007 (2♂), IV-2007 (27♀), from *V. vinifera* leaf; VI-2007 (1♀), from *V. vinifera* bud. **CANDIOTA**: **Merlot**: V-2007 (1♀), from *B. pilosa*; II-2007 (1♀), III-2007 (1♀), IV-2007 (2♂), from *V. vinifera* leaf.

Previous records for Brazil: Rio Grande do Sul and Mato Grosso (Ferla and Moraes 2003; Ferla et al. 2007).

Comments: Species reported in strawberry culture in Rio Grande do Sul (Ferla et al. 2007). It shows high oviposition levels when fed on tetranychid, eriophyid mites and pollen of *Typha angustifolia* L. (1753) (Ferla and Moraes 2003).

*Zetzellia malvinae* Mاتيولي, Ueckermann and Oliveira, 2002

*Zetzellia malvinae* Mاتيولي, Ueckermann and Oliveira,

2002: 111.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **CANDIOTA**: **Merlot**: VI-2007 (1♀), from *Senecio* sp.; VII-2007 (2♀), from *S. selloi*; II-2007 (1♀), IV-2007 (5), from *V. vinifera* leaf; V-2007 (1♀), VI-2007 (1♀), from *V. vinifera* bud.

Previous records in Brazil: São Paulo (Mاتيولي et al. 2002).

Comments: It was described from specimens of citrus (Mاتيولي et al. 2002).

## TARSONEMIDAE Kramer, 1877

*Acaronemus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: VIII-2007 (1♀), from *P. tomentosa*; IV-2007 (1♀), from *V. vinifera* bud. **Merlot**: VII-2007 (1♀), from *P. tomentosa*; V-2007 (1♀), from *Rumex* sp.; X-2006 (1♀), from *Trifolium Repens* L. (1753); VI-2007 (1♀), VIII-2007 (1♀), from *V. vinifera* bud. **CANDIOTA**: **Chardonnay**: X-2006 (1♀), from *Solanum* sp.; I-2007 (1♀), from *S. americanum*; I-2007 (1♀), from *V. vinifera* leaf; V-2007 (1♀), VII-2007 (1♀), from *V. vinifera* bud. **Merlot**: IV-2007 (1♂), from *B. pilosa*; V-2007 (1♂), from *R. brasiliensis*; V-2007 (1♀), from *Sida* sp.; II-2007 (1♀), IV-2007 (3♀1♂), from *V. vinifera* leaf; V-2007 (1♀), from *V. vinifera* bud.

*Polyphagotarsonemus latus* (Banks, 1904)

*Tarsonemus latus* Banks, 1904: 1553.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: I-2007 (5♀2♂), from *B. pilosa*; IV-2007 (1♀), from *P. tomentosa*; I-2007 (24♀9♂), from *S. mauritianum*; XII-2006 (2♀), I-2007 (656♀71♂), II-2007 (34♀), from *V. vinifera* leaf. **Merlot**: *Conium maculatum* L., I-2007 (1♀); I-2007 (84♀35♂), from *V. vinifera* leaf.

Previous records for Brazil: Pernambuco and Rio Grande do Sul (Ferreira et al. 2006; Johann et al. 2009; Soria et al. 1993)

Comments: As a grapevine pest, it causes branch shortening (Botton et al. 2005). In situations of high infestation, the leaves get coriaceous and brittle, and leaf fall may occur (Haji et al. 2001).

*Tarsonemus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES**: **Chardonnay**: I-2007 (1♀), from *S. mauritianum*; VII-2007 (1♀), from *P. tomentosa*; I-2007 (1♀), III-2007 (1♀), from *V. vinifera* leaf; IV-2007 (6♀), V-2007 (31), VI-2007 (2♀), VII-2007 (2♀1♂), VIII-2007 (5♀), IX-2007 (3♀1♂), from *V. vinifera* bud. **Merlot**: VIII-2007 (1♀), from *P. lanceolata*; VII-2007 (1♀), VIII-2007(11), from *P. tomentosa*; VII-2007 (1♀), from *Rumex* sp.; XII-2006 (1♀), IV-2007 (1♀), from *V. vinifera* leaf; V-2007 (9♀), VI-2007 (27♀), VIII-2007 (2♀), from *V. vinifera* bud. **CANDIOTA**: **Chardonnay**: VI-2007(1♀), from *Baccharis trimera* Less. (1836); VIII-2007 (2♀), from *Conysa canadensis* L.; II-2007(1♀), IV-2007 (44♀8♂), from *V. vinifera* leaf; V-2007 (1♀), VI-2007 (1♀), VII-2007 (3♀), VIII-2007 (1♀), from *V. vinifera* bud. **Merlot**: IV-2007 (5♀), from *B. pilosa*; IX-2007 (2♀), from *Eupatorium buniifolium*



Hook and Arn. (1835); V-2007 (1♀), from *Galinsoga quadriradiata* Ruiz and Pav. (1794); IX-2007 (1♀), from *Gnaphalium spicatum* Lam. (1788); VIII-2007 (4♀), from *Senecio* sp.; V-2007 (1♀), from *Sida* sp.; IV-2007 (4♀), from *S. americanum*; III-2007 (2♀), IV-2007 (30♀7♂), from *V. vinifera* leaf; V-2007 (13♀), VI-2007 (2♀), VIII-2007 (21♀), IX-2007 (3♀), from *V. vinifera* bud.

*Xenotarsonemus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** VIII-2007 (1♀), *P. lanceolata*; XI-2006 (1♀), VIII-2007 (1♀), from *P. tomentosa*. **CANDIOTA: Chardonnay:** VI-2007 (1♀), from *P. tomentosa*. **Merlot:** VII-2007 (2♂), IX-2007 (3♀), from *B. trimera*; IX-2007 (1♀), from *E. buniifalium*; IX-2007 (1♀), from *G. spicatum*; VI-2007 (1♀), from *Oxalis corniculata* L. (1753); IV-2007 (2♀), from *R. brasiliensis*.

TENUIPALPIDAE Berlese, 1913

*Brevipalpus phoenicis* (Geijskes, 1939)

*Tenuipalpus phoenicis* Geijskes, 1939: 23.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** IV-2007 (1♀), from *V. vinifera* leaf. **CANDIOTA: Merlot:** VII-2007 (1♀), IX-2007 (5♀), from *B. trimera*; VIII-2007 (18♀2♂), from *Gnaphalium* sp.; VIII-2007 (1♀), from *Rumex* sp..

Previous records for Brazil: São Paulo, Santa Catarina, Pernambuco and Ceará (Oliveira 1986; Lorenzato 1987; Ferla et al. 2005).

Comments: Reported as citrus leprosis mite, it is the vector of the CiLV virus, agent of the disease in citrus (Chiavegato 1987). It is also associated with coffee ringspot, where it transmits the CoRSV virus (Chagas 1973). It is not referred to cause economic damage on grapevine culture (Flechtmann 1979).

TETRANYCHIDAE Donnadieu, 1875

*Mononychellus planki* (McGregor, 1950)

*Tetranychus planki* McGregor, 1950: 300.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** V-2007 (1♀), from *S. santaremnensis*.

Previous records for Brazil: Broad distribution in Brazil (Moraes and Flechtmann 2008).

Comments: It is not a species of economic importance, but it may be considered a potential cotton pest. It was found in soybean, *Glycine max* (L.) (1917) Merr., in Rio Grande do Sul (Roggia et al. 2008), where its populations seemed to be increasing in the latest years.

*Oligonychus yothersi* (McGregor, 1914)

*Tetranychus yothersi* McGregor, 1914: 355.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** X-2006 (1♀), from *V. vinifera* leaf. **Merlot:** X-2006 (1♂), from *V. vinifera* leaf.

Previous records for Brazil - Paraná, Rio Grande do Sul, Santa Catarina and São Paulo (Ferla et al. 2005).

Comments: It is known as yerba mate red mite. It attacks new and ripe leaves, causing brazing and defoliation in

severe attacks. During dry and warm periods it attacks in outbreak, usually disappearing after intense rainfall (Flechtmann 1979; Coll and Saini 1992).

*Oligonychus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** I-2007 (1♀), from *T. officinale*.

*Panonychus ulmi* (Koch, 1836)

*Tetranychus ulmi* Koch, 1836: 11.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** I-2007 (10♀), III-2007 (2♂), from *V. vinifera* leaf. **Merlot:** X-2006 (2♀), XI-2006 (2♀2♂), I-2007 (24♀3♂), II-2007 (7♀), III-2007 (8♀), from *V. vinifera* leaf.

Previous records for Brazil: Rio Grande do Sul (Ferla and Botton 2008).

Comments: This species is also considered an apple pest, causing leaf brownish, reducing branch growth, size, fruit color and the sugar content, and also causing premature leaf fall. It interferes on the following year's flowering and fructification (Monteiro 2002). It was observed on grapevine in Rio Grande do Sul, where the leaves showed brownish, with reddish branches on adaxial face and premature leaf fall (Ferla and Botton 2008).

*Petrobia* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** VI-2007 (8♀), from *P. annua*.

*Tetranychus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** I-2007 (6♀), II-2007 (1♀), from *Galinsoga parviflora* Cav. (1794).

TYDEIDAE Kramer, 1877

*Lorryia formosa* Cooreman, 1958

*Lorryia formosa* Cooreman, 1958: 6.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** V-2007 (1♀), from *S. santaremnensis*; IV-2007 (1♀), from *V. vinifera* leaf.

Previous records for Brazil: São Paulo (Feres et al. 2003).

Comments: This mite is rather common in Brazil and has been collected from a rather wide range of plants (Flechtmann 1973, 1987; Feres et al. 2003; Hernandez and Feres 2006). Populations of this mite may cause sclerotization of the foliar limb followed by scaling in the area where they are concentrated (Jeppson et al. 1975).

*Lorryia* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Merlot:** I-2007 (1♀), IV-2007 (1♀), from *V. vinifera* leaf. **CANDIOTA: Merlot:** V-2007 (1♀), from *V. vinifera* bud.

*Metatritophydeus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** IX-2007 (1♀),

from *Senecio* sp.; I-2007 (4♀), from *V. vinifera* leaf; V-2007 (1♀), VI-2007 (1♀), IX-2007 (1♀), from *V. vinifera* bud.

#### *Paralorryia* sp.

Specimen examined: Brazil, Rio Grande do Sul, **CANDIOTA: Merlot:** IV-2007 (1♀), from *R. brasiliensis*.

#### *Tydeus* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** V-2007 (3♀), from *B. pilosa*; X-2006 (1♀), VII-2007 (1♀), from *C. maculatum*; IV-2007 (3♀), IX-2007 (1♀), from *P. tomentosa*; IX-2007 (1♀), from *Senecio* sp.; VI-2007 (1♀), from *S. oleraceus*; XII-2006 (6♀), I-2007 (1♀), II-2007 (3♀), III-2007 (21♀), from *V. vinifera* leaf; IV-2007 (4♀), V-2007 (46♀11♂), VI-2007 (60♀5♂), VII-2007 (8♀), VIII-2007 (3♀), IX-2007 (1♀), from *V. vinifera* bud. **Merlot:** VII-2007 (32♀5♂), VIII-2007 (14♀), from *P. tomentosa*; VII-2007 (4♀), from *Rumex* sp.; VI-2007 (7♀), from *S. nodiflora*; VI-2007 (1♀), from *T. repens*; XI-2006 (2♀), XII-2006 (1♀), III-2007 (1♀), IV-2007 (52♀), from *V. vinifera* leaf; V-2007 (8♀), VI-2007 (107♀11♂), VII-2007 (28♀), VIII-2007 (4♀), from *V. vinifera* bud. **CANDIOTA: Chardonnay:** VIII-2007 (6♀), from *C. canadensis*; VI-2007 (6♀), from *P. tomentosa*; VIII-2007 (2♀), from *Rumex* sp.; IX-2007 (6♀), from *Senecio brasiliensis* Less.; V-2007 (3♀), from *S. americanum*; VI-2007 (8♀), from *Solidago chilensis* Meyen.; IV-2007 (1♀), from *S. oleraceus*; II-2007 (1♀), III-2007 (1♀), from *V. vinifera* leaf; IV-2007 (28♀), V-2007 (9♀), VI-2007 (39♀), VII-2007 (3♀), VIII-2007 (3♀), from *V. vinifera* bud. **Merlot:** IV-2007 (2♀), V-2007 (4♀), *B. pilosa*; V-2007 (2♀), from *G. quadriradiata*; IV-2007 (2♀), V-2007 (13♀), from *R. brasiliensis*; VI-2007 (4♀), from *Senecio* sp.; VI-2007 (7♀), from *S. brasiliensis*; VII-2007 (2♀), from *S. selloi*; V-2007 (1♀), from *Sida* sp.; IV-2007 (17♀), from *S. americanum*; V-2007 (3♀), from *S. oleraceus*; III-2007 (1♀), IV-2007 (77♀7♂), from *V. vinifera* leaf; V-2007 (26♀), VI-2007 (45♀), VII-2007 (6♀), VIII-2007 (6♀), from *V. vinifera* bud.

### SUBORDER ASTIGMATA

#### HISTIOSTOMIDAE Hughes, 1976

##### *Histiostoma* sp.

Specimen examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** VII-2007 (1♀), from *Rumex* sp. L..

#### WINTERSCHMIDTIIDAE Oudemans, 1923

##### *Czenspinskia* sp.

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** XII-2006 (1♀), from *V. vinifera* leaf. **Merlot:** VII-2007 (1♀), from *V. vinifera* bud.

### SUBORDER ORIBATIDA

Locality of the specimens examined: Brazil, Rio Grande do Sul, **BENTO GONÇALVES: Chardonnay:** VIII-2007 (1♀), from *P. tomentosa*; VII-2007 (3♀), from *S. arvensis*; IX-2007

(3♀), from *V. vinifera* bud. **Merlot:** VIII-2007 (3♀), from *P. lanceolata*; X-2006 (2♀), IV-2007 (5♀), VI-2007 (2♀), VII-2007 (1♀1♂), VIII-2007 (4♀2♂), from *P. tomentosa*; V-2007 (1♀), from *Rumex* sp.; V-2007 (1♀), from *S. santaremnensis*. **CANDIOTA: Chardonnay:** VIII-2007 (1♀), from *B. trimera*; VIII-2007 (1♀), from *C. canadensis*; VII-2007 (3♀1♂), from *Gnaphalium* sp.; IV-2007 (1♀), VI-2007 (5♀), from *P. tomentosa*; VII-2007 (3♀), VIII-2007 (1♀), from *Rumex* sp.. **Merlot:** VI-2007 (3♀), from *Blainvillea* sp.; VII-2007 (3♀), from *Gnaphalium* sp.; VIII-2007 (1♀), from *Senecio* sp.

Mites found in each plant species associated with grapevine sampled are presented in Table 1. The grapevine culture presented great mite richness, higher number of species in Bento Gonçalves (46 species) than in Candiota (21 species). This fact may be related to the recent introduction of the culture in that region or to distinct environmental factors and climate, once Bento Gonçalves is located in the northeast upper slopes, where rainfall and humidity are high, while Candiota is located in west border of the state and has a drier climate and low relative humidity, mainly during the ripening period.

*Calepitrimerus vitis* and *Cololomerus vitis* were the most abundant species, with *Cal. vitis* being the most common species in the leaves, indicating it is probably the more important phytophagous mite in grapevine in the state. Their monitoring is necessary, because higher populations may cause bud's death decreasing the vegetative growth and leaves brownish with decrease of plant photosynthetic capacity (Duso and De Lillo 1996). The interference on plant photosynthetic capacity also interferes in the quality of the wine produced, since good wines are produced with grapes of good quality (Vencato 2007).

*Colomerus vitis* was noted only in Merlot cultivar in the two places sampled and populations are much higher in buds. This species may cause deformation in buds and new leaves or still cause the appearance of eriosis of the leaves (Jeppson et al. 1975; Flechtman 1979; Duso and De Lillo 1996).

Just two tetranychid mite species were observed in Bento Gonçalves. *Oligonychus yothersi* was found at low density and does not present economic importance to the culture. *Panonychus ulmi*, present in the two cultivars studied in Bento Gonçalves, was recently reported in the culture in Brazil, with damages described by Ferla and Botton (2008). Commonly associated to Europe grapevine (Jeppson et al. 1975; Schruft 1985; Bolland et al. 1998), it becomes important to the culture in Rio Grande do Sul. Although *P. ulmi* has not appeared in high density, its finding denotes that this species should be inserted in integrated pest management programs in the state of Rio Grande do Sul.

Four Tarsonemid species were identified and the most abundant were *Polyphagotarsonemus latus* and *Tarsonemus* sp.. *Polyphagotarsonemus latus* was present just in Bento Gonçalves and only on apical leaves. It occurred mainly in January on new leaves after pruning green, suggesting that species did not interfere in vineyard formation (Johann et al. 2009). Nothing is known about the damage caused by this species in that period in grapevine plants.



**TABLE 1.** Mitefauna of the uncultivated plants associated with grapevine Chardonnay (C) and Merlot (M), in the municipalities of Bento Gonçalves (BG) and Candiota (CA), Rio Grande do Sul, Brazil.

VEGETAL TAXON	MITES ASSOCIATED	BG		CA	
		C	M	C	M
AMARANTHACEAE					
Amaranthus sp.	-				
Amaranthus deflexus L. (1771)	-				
Amaranthus hybridus L. (1753)	-				
APIACEAE					
	Neoseiulus californicus		1		
Conium maculatum	Polyphagotarsonemus latus		1		
	Tydeus sp.	2			
ASTERACEAE					
	Acaronemus sp.				1
	Agistemus floridanus				1
	Neoseiulus californicus				1
Bidens pilosa	Polyphagotarsonemus latus	7			
	Pronematus anconai		1		1
	Tarsonemus sp.				5
	Tydeus sp.	3			6
Baccharis trimera	Breviphalpus phoenicis			10	6
	Arrenoseius gaucho				1
Blainvillea sp.	Neoseiulus californicus				1
	Oribatida				3
Conyza sp.	-				
	Neoseiulus californicus			1	
Conysa canadensis	Tarsonemus sp.			2	
	Tydeus sp.			6	
Emilia sonchifolia L. (1834)	-				
	Tarsonemus sp.				2
Eupatorium buniifalium	Xenotersonemus sp.				1
Galinsoga sp.	Agistemus sp. <sup>2</sup>		2		
Galinsoga parviflora	Tetranychus sp.	7			
	Tarsonemus sp.				1
Galinsosa quadriradiata	Tydeus sp.				1
	Breviphalpus phoenicis				20
Gnaphalium sp.	Oribatida			4	3
	Tarsonemus sp.				1
Ganphalium spicatum	Xenotersonemus sp.				1
Hypochoeris radicata L. (1753)	-				
	Arrenoseius gaucho				1
	Metetrioptydeus sp.	1			
	Neoseiulus californicus				5
	Oribatida				1
Senecio sp.	Tarsonemus sp.				4
	Tydeus sp.	1			5
	Typhlodromalus aripo	1			
	Zetzellia malvinae				1
Senecio brasiliensis	Tydeus sp.			6	7
	Pronematus anconai				1
Senecio selloi	Tydeus sp.				2
	Zetzellia malvinae				2
	Neoseiulus californicus			1	
Solidago chilensis	Tydeus sp.			8	
	Neoseiulus californicus		1		
Sonchus oleraceus	Pronematus anconai	33	12	4	
	Tydeus sp.	1		1	3

TABLE 1. CONTINUED.

VEGETAL TAXON	MITES ASSOCIATED	BG		CA	
		C	M	C	M
<i>Synedrella nodiflora</i>	<i>Arrenoseius gaucho</i>		2		
	<i>Tydeus</i> sp.		7		
	<i>Lasioseius</i> sp.		1		
<i>Taraxacum officinale</i>	<i>Oligonychus</i> sp.	1			
	<i>Pronematus anconai</i>	2			
CARYOPHYLLACEAE					
<i>Stellaria media</i> (L.) Vill. (1784)	-				
GRAMINEAE					
<i>Poa annua</i>	<i>Petrobia</i> sp.		8		
	<i>Pronematus anconai</i>		5		
FABACEAE					
<i>Medicago hispida</i> Gaertn. (1791)	-				
<i>Medicago lupulina</i> L. (1753)	-				
<i>Trifolium pratenses</i> L. (1753)	-				
<i>Trifolium repens</i>	<i>Acaronemus</i> sp.		1		
	<i>Pronematus anconai</i>		1		
	<i>Tydeus</i> sp.		1		
<i>Vicia sativa</i> Guss. (1828).	-				
LAMIACEAE					
<i>Leonurus sibiricus</i> L. (1753)	-				
<i>Stachys arvensis</i>	<i>Amblyseius vitis</i>	1			
	Oribatida	3			
	<i>Pyemotes</i> sp.	1			
LYTHRACEAE					
<i>Cuphea</i> sp.	-				
MALVACEAE					
<i>Malvastrum coromandelianum</i> L.(1857)	-				
	<i>Acaronemus</i> sp.				1
<i>Sida</i> sp.	<i>Calepitrimerus vitis</i>				2
	<i>Tarsonemus</i> sp.				1
	<i>Tydeus</i> sp.				1
<i>Sida rhombifolia</i> L. (1753)	-				
	<i>Agistemus</i> sp. <sup>3</sup>		2		
	<i>Crioticus sidae</i>		14		
	<i>Lorryia formosa</i>		1		
<i>Sida santaremnensis</i>	<i>Mononychellus planki</i>	1			
	<i>Neoseiulus californicus</i>			1	
	Oribatida		1		
	-				
<i>Sida spinosa</i> L. (1753)	-				
OXALIDACEAE					
<i>Oxalis corniculata</i>	<i>Xenotarsonemus</i> sp.				1
PLANTAGINACEAE					
<i>Plantago lanceolata</i>	<i>Arrenoseius gaucho</i>		1		
	Oribatida		3		
	<i>Tarsonemus</i> sp.		3		
	<i>Xenotarsonemus</i> sp.		1		



TABLE 1. CONTINUED.

VEGETAL TAXON	MITES ASSOCIATED	BG		CA	
		C	M	C	M
<i>Plantago tomentosa</i>	<i>Acaronemus</i> sp.	1	1		
	<i>Agistemus floridanus</i>		1		
	<i>Amblyseius vitis</i>			1	
	<i>Asca</i> sp.	2		1	
	<i>Diseius</i> sp.	1			
	<i>Euseius ho</i>		1		
	<i>Arrenoseius gauch</i> o	4	9	7	
	<i>Leioseius</i> sp.	1		1	
	<i>Neocunaxoides</i> sp.			8	
	<i>Neoseiulus californicus</i>			1	
	Oribatida	1	17	16	
	<i>Polyphagotarsonemus latus</i>	1			
	<i>Pronematus anconai</i>	9			
	<i>Pygmephorus</i> sp.	1			
	<i>Tarsonemus</i> sp.	1	12		
	<i>Tydeus</i> sp.	4	51	6	
	<i>Ttyphlodromus ornatus</i>			1	
	<i>Xenotarsonemus</i> sp.		2	1	
PLYGONACEAE					
<i>Rumex</i> sp.	<i>Acaronemus</i> sp.		1		
	<i>Amblyseius vitis</i>	1			
	<i>Breviphalpus phoenicis</i>				1
	<i>Euseius inouei</i>		1		
	<i>Arrenoseius gauch</i> o			1	
	<i>Histiostoma</i> sp.	1			
	Oribatida		1	4	
	<i>Pronematus anconai</i>	2			
	<i>Tarsonemus</i> sp.		1		
	<i>Tydeus</i> sp.		4	2	
POACEAE					
<i>Brachiaria</i> sp. (Trin.) Griseb. (1853)	-				
<i>Cenchrus</i> sp. L. (1753)	-				
<i>Digitaria</i> sp.	<i>Pronematus anconai</i>				1
	<i>Paspalum</i> sp.		2		
<i>Digitaria sanguinalis</i> (L.) Scop. (1771)	-				
<i>Eleusine distachya</i> Nees. (1829)	-				
<i>Eragrostis</i> sp. Wolf (1776)	-				
<i>Lolium multiflorum</i> Lam. (1779)	-				
<i>Paspalum</i> sp.	-				
PORTULACACEAE					
<i>Portulaca oleraceae</i> L. (1753)	-				
RUBIACEAE					
<i>Richardia brasiliensis</i>	<i>Acaronemus</i> sp.				1
	<i>Czenpinskia</i> sp.				1
	<i>Arrenoseius gauch</i> o				3
	<i>Paralorryia</i> sp.				1
	<i>Pronematus anconai</i>				3
	<i>Tydeus</i> sp.				15
	<i>Xenotarsonemus</i> sp.				2
<i>Spermacoce verticillata</i>	<i>Tetranychus</i> sp.			2	
SOLANACEAE					
<i>Nicotiana tabacum</i> L.(1753)	-				
<i>Solanum</i> sp.	<i>Acaronemus</i> sp.			1	

TABLE 1. CONTINUED.

VEGETAL TAXON	MITES ASSOCIATED	BG		CA	
		C	M	C	M
<i>Solanum americanum</i>	<i>Acaronemus</i> sp.			1	
	<i>Aceria</i> sp.				3
	<i>Asca</i> sp.				1
	<i>Brevipalpus phoenicis</i>			1	
	<i>Calepitrimerus vitis</i>				1
	<i>Pronematus anconai</i>			1	1
	<i>Tarsonemus</i> sp.				4
	<i>Tydeus</i> sp.			3	17
	<i>Aceria</i> sp.	40			
<i>Solanum mauritianum</i>	<i>Arrenoseius gaucho</i>	2			
	<i>Homeopronematus</i> sp.	1			
	<i>Polyphagotarsonemus latus</i>	33			
	<i>Pronematus anconai</i>	4			
	<i>Tarsonemus</i> sp.	1			
URTICACEAE					
<i>Parietaria debilis</i> G.Forst. (1786)	-				
TOTAL		176	174	103	149

Amongst the predatory mites, the Phytoseiidae presented the higher diversity, mainly in Bento Gonçalves. *Neoseiulus californicus*, the most common species, was observed in both localities, associated with *Cal. vitis*. The phytoseiid mite diversity in Serra Gaucha can be related to the presence of tetranychids mites, while low diversity was found in Candiota where this phytophagous group was not found. Tetranychid mites are favorable preys to Phytoseiidae predator mites and the presence of this preys can hold higher number of prey (McMurtry and Croft 1997; Moraes 2002). *Neoseiulus californicus* has been utilized in program of biologic control of *P. ulmi* in apple culture with relative success in the states of Rio Grande do Sul and Santa Catarina (Monteiro 2002). In Candiota, the occurrence of *N. californicus* was reported in the same period in which *Cal. vitis* was found, indicating possible interactions. According to Moraes (2002), there are some species of Eriophyidae that are quite favorable preys to development of phytoseiid mites. Johann *et al.* (2009), also observed high population of this predator associated with *Cal. vitis* in Candiota.

The Iolinidae was the most frequent predatory mite and *P. anconai* was the most abundant species associated with *Cal. vitis* and *P. latus* populations, suggesting that it can be an important natural enemy of these species. Species of this family have been reported by Laing and Knop (1982) and Perrin and McMurtry (1996) as predators of eriophyid mites. In Germany, *Pronematus staerki* Schruft is an important natural enemy of *Cal. vitis* (Duso and De Lillo 1996). *Pronematus anconai* was previously reported in the grapevine varieties Alfrocheiro, Cabernet Sauvignon and Pinot Noir in the cities of Bento Gonçalves and Candiota, in Rio Grande do Sul (Johann *et al.* 2009).

The Tydeidae also showed great species richness (five species) and *Tydeus* sp. was the most abundant both the localities evaluated. The species was more frequent on

leaves during the senescent period, in April and May, and in the bud beginning period. Species of this genus were reported as mites with different feeding habits by several authors. *Tydeus caudatus* Dugès, *T. goetzi* Schruft and *T. grabouwi* Meyer and Ryke were reported as natural enemies of *Cal. vitis* and *Col. vitis* in Europe and South Africa (Duso *et al.* 2004). Representatives of this family were also observed feeding on fungi (Hessein and Perring 1986). The tydeids may have high ecologic importance in agroecosystems to be considered as alternative food to phytoseiid mites (Strickler *et al.* 1987; McMurtry and Croft 1997; Ferla and Moraes 1998). The consumption of alternative food keeps the predators in the environment where the preferential prey is absent (McMurtry and Croft 1997).

Amongst the Stigmaeidae, *Agistemus floridanus* was the only species found, with higher population in Bento Gonçalves mainly on Chardonnay cultivar in the same period when *Cal. vitis* was in high population. According to Ferla and Moraes (2003), Eriophyidae are the most appropriate food to *A. floridanus*.

The associated plants evaluated in this study contained 39 species of mites, 17 of them as predators. A higher number was collected in *Plantago tomentosa*, with 163 mites, followed by *Solanum* sp., with 115 mites. On *P. tomentosa* 17 species were observed, on *Rumex* sp., ten species, *Senecio* sp., nine, on *Solanum americanum*, eight, on *Bidens pilosa* and *Richardia brasiliensis*, seven and on *Sida sartaremnensis* six species of mites. On strawberry culture, in Rio Grande do Sul, *B. pilosa*, *Rumex* sp. and *Richardia* sp., also presented higher diversity of predator mites (Ferla *et al.* 2007).

Some associated plants in this study presented low diversity of mites and in 26 vegetal species no mites were found. These results, however, may be under the influence of the sampling frequency whereupon each plant was sampled on different places, so few samples from these



plants have been collected.

Uncultured plants occurred naturally and have spontaneous cultivation growth areas. These, in turn, offer many important requirements to natural enemies, such as host and alternative prey, pollen or nectar, as well as microhabitat not available in monocultures free of associated plants (Van Emden 1965). The greater frequency of these plants in agroecosystems can reduce the pest population, since they can hold large predators diversity, and these can naturally migrate from associated plants to cultivated plants (Altieri *et al.* 2003; Bellini *et al.* 2005).

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